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**B60R 1/00**

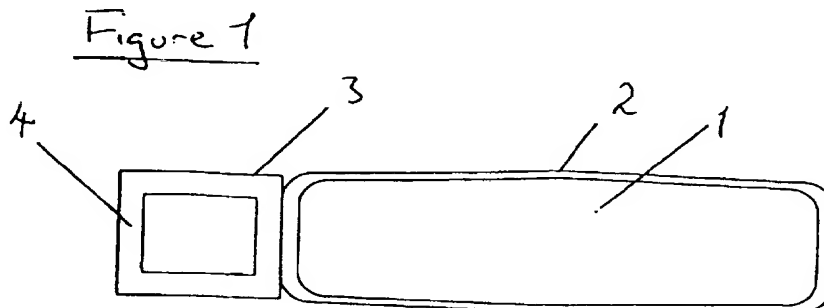
(52) UK CL (Edition R )  
**B7J J69**

(56) Documents Cited  
**US 5642238 A** **US 5289321 A**

(58) Field of Search  
UK CL (Edition Q ) **B7J J69**  
INT CL<sup>6</sup> **B60R 1/00 1/02 1/08**  
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(54) Abstract Title  
**Vehicle reversing aid**

(57) A vehicle reversing aid which provides the vehicle driver with an enhanced view of the region adjacent to the rear of the vehicle is provided by a video camera and a rear view assembly, characterised in that the assembly includes a first module, typically a rear view mirror (1), and a second module including a display screen (3) to show the image captured by the video camera. The driver simultaneously sees a general view to the rear of the vehicle and a close-up view of the region at the rear of the vehicle as displayed on the screen (3). The display screen 3 may be located within the area of the mirror 1.



GB 2 351 055 A

1/3

Figure 1

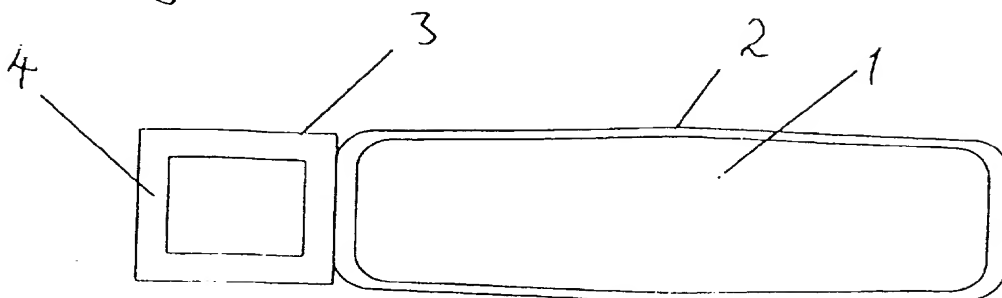
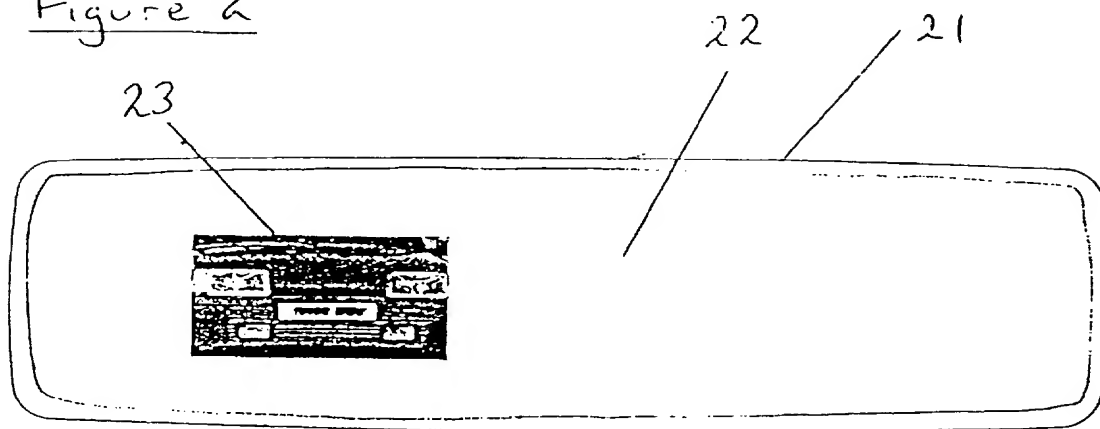


Figure 2



G B 1486

2/3

Figure 3 a

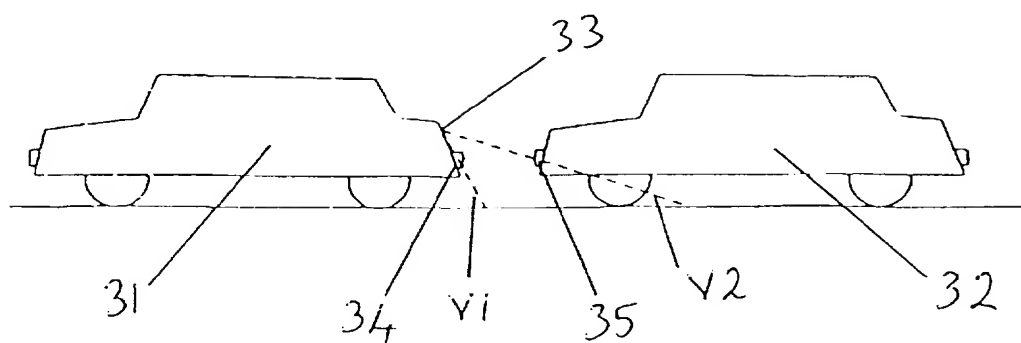
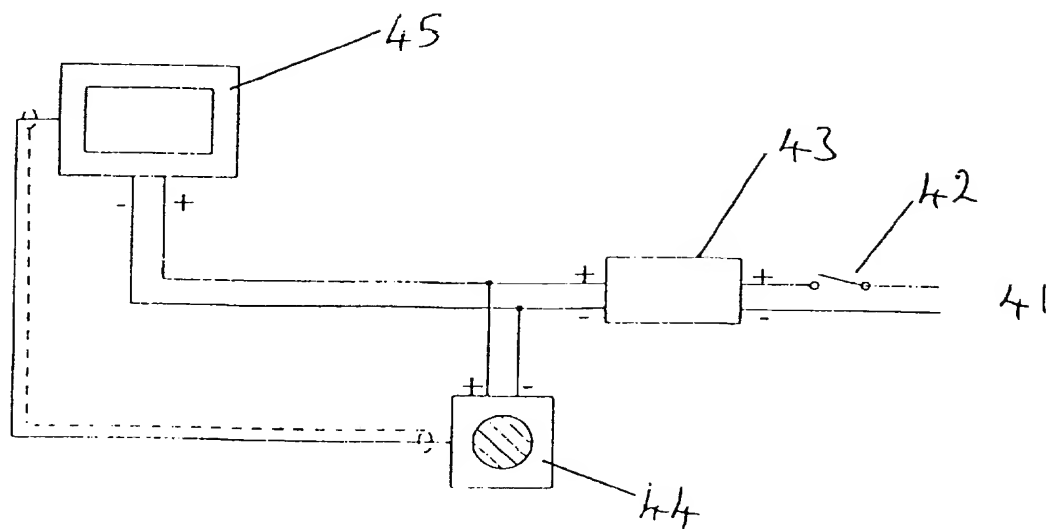
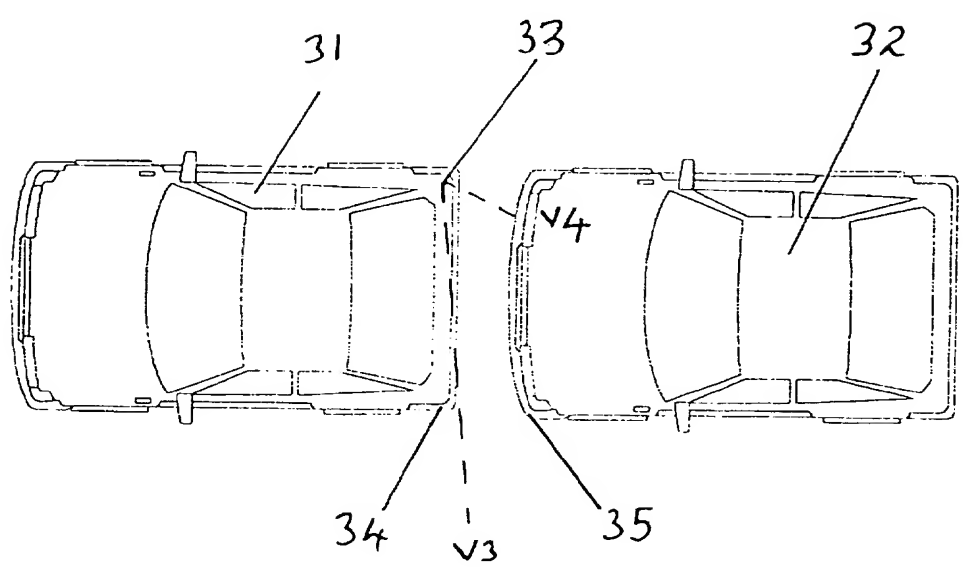


Figure 4



GB 1486

Figure 3b



## Vehicle reversing aid

This invention relates to a vehicle reversing aid which provides the vehicle driver with an enhanced view of the region adjacent to the rear of the vehicle.

5 Good awareness of what is behind a moving vehicle is of assistance to the driver at all times but especially when reversing and most particularly when reversing in a confined space. The awareness is important for reasons of safety and for avoiding damage to one or both of the vehicles and consequential  
10 disputes between their respective owners and insurers. Neither interior nor exterior mirrors give a clear view of the region adjacent to the rear of the vehicle. A particular difficulty arises in estimating the distance from an adjacent object such as a vehicle or an obstruction. In reversing into a parking  
15 space between vehicles at a kerbside many car drivers find it hard to judge the distance from the vehicle behind them.

It has hitherto been proposed, particularly for large vehicles, to mount a video camera at the rear of the vehicle to monitor  
20 the presence of any object close to the vehicle and to display the video image on a screen on the dashboard so as to indicate the position of the object relative to the vehicle.

The present invention has the objective of providing a clear  
25 view for a vehicle driver of all aspects of the situation behind the vehicle.

According to the present invention there is provided a reversing aid for a driver-operated vehicle which has a rear view assembly  
30 and is fitted at the rear with a video camera directed to an area immediately to the rear of the vehicle, characterised in that the assembly includes two display modules, the first module providing a general view to the rear of the vehicle and the

second module comprises a display screen to show the image captured by the video camera.

The reversing aid according to the invention offers the  
5 advantage of simultaneously presenting to the driver both a  
general view, usually a wide angle view, to the rear of the  
vehicle and a close-up view of the area to the rear of the  
vehicle as displayed on the video screen. This combination has  
important safety implications in that a single glance takes in  
10 the situation distant from the vehicle and immediately adjacent  
to it. It is also beneficial in that the driver instinctively  
looks to a rear view unit to assess the position behind the  
vehicle and thus conveniently takes in whichever view is most  
relevant. In the case of reversing into a parking space the  
15 driver can pay more attention to the video image.

A further advantage of the reversing aid according to the  
invention is that the video screen does not occupy any space on  
the vehicle dashboard or console, leaving these free for the  
20 customary instrument gauges and controls. Indeed in many modern  
cars there is no spare space in the region of the dashboard or  
console.

The first module of the assembly can simply be a conventional  
25 rear view mirror but can alternatively be a second display  
screen linked to a second video camera which is aligned to give  
a general view to the rear of the vehicle.

The video camera which provides a close-up view (referred to  
30 herein as the "close-up" camera) is preferably located in a  
position at which it gives an angled view to the rear. This can  
be achieved by mounting the camera at an angle or by facing the  
camera directly backwards with a small interposed mirror to give  
the required view. The positioning of the camera and any  
35 interposed mirror is desirably such as to give an image which

shows both the rear of the vehicle and the leading portion of an adjacent object. Such an image assists in simultaneously showing the vehicle driver both the distance between the vehicle and the object, such that the driver can manoeuvre the vehicle  
5 with great precision.

The close-up camera or any interposed mirror is thus suitably located above or below the vehicle's rear bumper (fender) - or the position this would occupy if present - or to one side of  
10 the rear of the vehicle. One convenient location is within the vehicle's rear light cluster.

The positioning of the camera(s) is preferably chosen to provide protection against damage and to avoid obstructions to the  
15 required view.

Within the assembly the respective locations of the first and second modules are preferably chosen to complement each other. It is preferred that the image from the or each video camera be  
20 laterally inverted for display on the screen so as to correspond to the reversal provided by a conventional mirror. Complementary images in the assembly, whether both from video cameras or from a mirror for the general view and video camera for the close-up view, assist in allowing the driver to make a  
25 rapid simultaneous assessment of the situation behind the vehicle.

While the close-up view can be located within the area of the general view, it is preferably located outside but immediately  
30 adjacent to the general view.

The video camera(s) can be monochrome or colour but monochrome is generally preferred as giving higher sensitivity than a colour camera. For both the general and close-up views the  
35 preferred depth of focus is from about 10 mm to infinity. A wide

viewing angle is desirable, from about 70° up to almost 180° and can be provided by a suitable lens, e.g. a fish-eye lens.

In general just one video camera is sufficient for the  
5 respective view, but the invention also offers the possibility  
of using more than one camera. Similarly the assembly can  
employ several video screens, each screen giving a different  
view to the rear of the vehicle. Multiple screens showing views  
from multiple cameras can be shared between different  
10 assemblies, for example a screen on a left-hand rear view  
assembly showing an image to the left of the vehicle, a screen  
on a right-hand rear view assembly showing an image to the right  
of the vehicle and a screen on a central interior assembly  
showing an image viewed from the centre of the vehicle.

15

The assembly may form an interior rear view unit or an exterior  
rear view unit. In certain instances it may be desirable for  
more than one of the rear view units on the vehicle to be an  
assembly according to the invention, e.g. an interior mirror  
20 plus screen and/or left and right side mirrors plus screens.  
This ensures that the driver is presented with the close-up rear  
view from whichever unit is observed.

Examples of suitable display screens include a liquid crystal  
25 display (LCD), which may be backlit or reflective, a light  
emitting polymer (LEP), or a thin film device deposited directly  
on the rear view mirror.

The camera can typically include a lens module comprising an  
30 optical lens that focuses an incoming light signal on to an  
electronic detector. Examples of suitable detectors include a  
charge-coupled device (CCD) and a complementary metal oxide  
semiconductor (CMOS).



Electrical power for the screen(s) and camera(s) can conveniently be supplied by the battery of the vehicle, but an independent power supply for one or more of these can be employed if desired. The screen display can be provided at all times the vehicle power is on, but alternatively can be arranged to be shown only when the vehicle is in its reversing mode. The latter option can be provided by a switch associated with the vehicle gear selection lever.

By way of illustration, the invention is further described with reference to the accompanying figures, in which:

Figure 1 is a view of a first type of rear view assembly in a reversing aid according to the invention.

Figure 2 is a view of a second type of rear view assembly according to the invention.

Figure 3a is a side view of a vehicle fitted with a reversing aid according to the invention and of a second vehicle adjacent thereto.

Figure 3b is a plan view of a vehicle fitted with a reversing aid according to the invention and of a second vehicle adjacent thereto.

Figure 4 is a circuit diagram of a reversing aid according to the invention.

The rear view assembly illustrated in Figure 1 includes a mirror 1 enclosed in a frame 2 to which is clamped a second frame 3 surrounding an LCD screen 4. The assembly is attached to the vehicle windscreen by a support post (not shown) connected to the back of the frame 2.

In the alternative version of assembly illustrated in Figure 2 includes a frame 21 encloses a mirror 22 but in this version an LCD screen 23 is located within the area of the mirror surface. The assembly is again attached to the vehicle windscreen by a support post (not shown) connected to the vehicle roof.

Figures 3a and 3b show a first car 31 fitted with a video camera 33 at the upper part of its boot lid and having an interior rear view assembly (not shown) according to the invention. The car 31 is shown reversing towards a second car 32. The video camera 33 is aligned to have a field of vision indicated by the dotted lines V1 and V2 (figure 3a) and V3 and V4 (figure 3b). In a fore and aft direction the field of vision takes in the rear bumper 34 of the car 31 and the front bumper 35 of the car 32. In a sideways direction the field of vision takes in almost the whole width of the rear bumper 34 of the car 31 and the front bumper 35 of the car 32 and of the kerb. The image on the on the display screen of the rear view assembly of car 31 thus gives a clear indication of the distance between the cars and their distance from the kerb.

The Figure 4 circuit diagram shows the wiring input 41 from a car battery (not shown) and a control switch 42 attached to the vehicle's gear selection lever (not shown). The circuit includes a DC converter 43, a video camera 44 and an LCD display unit 45. The DC converter 43, which is located in the boot of the car, provides a stable 12 V DC output from the input from the car battery. The camera 44 is a monochrome CCD camera with a standard  $f = 3.6$  mm lens.

## CLAIMS

1. A reversing aid for a driver-operated vehicle which has a rear view assembly and is fitted at the rear with a video camera (33) directed to an area immediately to the rear of the vehicle, characterised in that that the assembly includes two display modules (1,3), the first module (1) providing a general view to the rear of the vehicle and the second module comprises a display screen (3) to show the image captured by the video camera (33).

2. A reversing aid as claimed in claim 1, in which the first module is a rear-view mirror (1).

3. A reversing aid as claimed in claim 1 or claim 2, in which the display screen (3) shows the image from a camera (33) which gives an angled view to the rear.

4. A reversing aid as claimed in claim 1 or claim 2, in which the angled view is provided via an interposed mirror.

5. A reversing aid as claimed in any preceding claim, in which the display screen (3) shows the image from a camera (33) located above or below the vehicle's rear bumper or to one side of the rear of the vehicle.

6. A reversing aid as claimed in claim 4, in which the camera is located within the vehicle's rear light cluster.

7. A reversing aid as claimed in any preceding claim, in which the respective locations of the first and second modules complement each other.

8. A reversing aid as claimed in claim 6, in which the image from the video camera (33) is laterally inverted for display on the display screen (3).

5 9. A reversing aid as claimed in any preceding claim, in which the display screen (3) is located within the area of the first module (1).

10 10. A reversing aid as claimed in any of claims 1 to 8, in which the display screen (3) is located immediately adjacent to first module (1).

15 11. A reversing aid as claimed in any preceding claim, which has more than one screen, each screen giving a different view to the rear of the vehicle.

12. A reversing aid as claimed in any preceding claim, which forms an interior rear view unit.

20 13. A reversing aid as claimed in any of claims 1 to 11, which forms an exterior rear view unit.

25 14. A reversing aid as claimed in any preceding claim, in which the display screen (3) is selected from a liquid crystal display (LCD), either backlit or reflective, a light emitting polymer (LEP), or a thin film device deposited directly on the rear view mirror.

30 15. A reversing aid as claimed in any preceding claim, in which the screen display is shown only when the vehicle is in its reversing mode.



Application No: GB 9914071.7  
Claims searched: 1-15

Examiner: Keith Kennett  
Date of search: 21 September 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B7J ( J69 )

Int Cl (Ed.6): B60R 1/00, 1/02, 1/08

Other: Online: EPODOC, WPI, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	US 5642238 ( SALA ) see Figure 3, column 2 lines 51-60 and column 3 lines 58-60	1-3,5-7, 9,11,13-15
X	US 5289321 ( SECOR ) see Figures 3,4 & 6, column 4 lines 11-22 and column 5 lines 27-30	1-3,5-8,10-12,14

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.